

CLAIMS

What is claimed is:

1. A method for canceling a leakage signal coupled from a transmitter to a receive signal path associated with a receiver, the transmitter and the receiver contained in a single wireless device operating using at least two frequency channels, the receiver operating on a first one of the at least two frequency channels and the transmitter operating on a second one of the at least two frequency channels, the method comprising:

sampling a signal for transmission on the second of the at least two frequency channels;

adjusting one or more parameters associated with the sampled signal to form an adjusted signal; and

combining the adjusted signal with the receive signal path including the leakage signal, to form a combined signal so as to cancel the leakage signal.

2. The method according to claim 1, wherein the single wireless device includes a frequency translating repeater.

3. The method according to claim 2, further comprising operating the frequency translating repeater in one of a wireless area network (WLAN) and a wireless metropolitan area network (WMAN).

4. The method according to claim 1, wherein the single wireless device includes a wireless terminal for use in one or more of voice and data communications.

5. The method according to claim 4, further comprising operating the wireless terminal according to one or more of an IS-95 protocol, a IS-2000 protocol, a W-CDMA, and a derivative protocol.

6. The method according to claim 1, further comprising:
sampling the combined signal to determine a metric associated with the leakage signal; and
re-adjusting the one or more parameters associated with the sampled signal to form a re-adjusted signal based on the determined metric.

7. The method according to claim 6, wherein the metric includes one or more of a power level, a received signal strength indicator (RSSI), a correlated power value, and a noise estimate associated with the receiver.

8. The method according to claim 6, wherein the re-adjusting the one or more parameters includes minimizing the metric associated with the leakage signal.

9. The method according to claim 8, wherein the minimizing includes minimizing according to one or more of a perturbation algorithm, a steepest decent algorithm, gradient algorithm, and statistical gradient algorithm.

10. The method according to claim 1, wherein the sampling includes sampling the signal for transmission after amplification of the signal.
11. The method according to claim 1, wherein the sampling includes sampling the signal for transmission prior to transmission of the signal over an antenna.
12. The method according to claim 1, wherein the sampling includes sampling the signal for transmission prior to passing the signal through a circulator.
13. The method according to claim 1, wherein the combining includes combining the adjusted signal using an antenna.
14. The method according to claim 1, wherein the combining includes combining the adjusted signal using a circulator.
15. The method according to claim 1, wherein the one or more parameters includes one or more of a phase shift parameter and a amplitude parameter.
16. An apparatus configured to cancel a leakage signal coupled from a transmitter to a receive signal path associated with a receiver, the transmitter and the receiver contained in a single wireless device operating using at least two frequency channels, the receiver operating on a first one of the at least two frequency channels and the transmitter operating on a second one of the at least two frequency channels, the apparatus comprising:
 - a radio frequency interface;

a processor; and
a memory coupled to the processor and the radio frequency interface, the memory containing instructions for causing the processor to:
sample a signal for transmission on the second of the at least two frequency channels;
adjust one or more parameters associated with the sampled signal to form an adjusted signal; and
combine the adjusted signal with the receive signal path including the leakage signal, to form a combined signal so as to cancel the leakage signal.

17. The apparatus according to claim 16, wherein the single wireless device includes a frequency translating repeater.

18. The apparatus according to claim 17, wherein the frequency translating repeater is configured to operate in one of a wireless area network (WLAN) and a wireless metropolitan area network (WMAN).

19. The apparatus according to claim 16, wherein the single wireless device includes a wireless terminal for use in one or more of voice and data communications.

20. The apparatus according to claim 19, wherein the wireless terminal is configured according to one or more of an IS-95 protocol, a IS-2000 protocol, a W-CDMA, and a derivative protocol.

21. The apparatus according to claim 20, wherein the instructions further cause the processor to:

sample the combined signal to determine a metric associated with the leakage signal; and

re-adjust the one or more parameters associated with the sampled signal to form a re-adjusted signal based on the determined metric.

22. The apparatus according to claim 21, wherein the metric includes one or more of a power level, a received signal strength indicator (RSSI), a correlated power value, and a noise estimate associated with the receiver.

23. The apparatus according to claim 21, wherein the instructions in causing the processor to re-adjust the one or more parameters further cause the processor to minimize the metric associated with the leakage signal.

24. The apparatus according to claim 23, wherein the minimizing includes minimizing according to one or more of a perturbation algorithm, a steepest decent algorithm, gradient algorithm, and statistical gradient algorithm.

25. The apparatus according to claim 16, wherein the instructions in causing the processor to sample further cause the processor sample the signal for transmission after amplification of the signal.

26. The apparatus according to claim 16, wherein the instructions in causing the processor to sample further cause the processor sample the signal for transmission prior to transmission of the signal over an antenna.
27. The apparatus according to claim 16, wherein the instructions in causing the processor to sample further cause the processor sample the signal for transmission prior to passing the signal through a circulator.
28. The apparatus according to claim 16, wherein the instructions in causing the processor to combine further cause the processor combine the adjusted signal using an antenna.
29. The apparatus according to claim 16, wherein the instructions in causing the processor to combine further cause the processor combine the adjusted signal using a circulator.
30. The apparatus according to claim 16, wherein the one or more parameters includes one or more of a phase shift parameter and a amplitude parameter.
31. The apparatus according to claim 16, wherein instructions cause the processor to continuously minimize the determined metric only when the transmitter is actively transmitting the signal.

32. A canceller configured to cancel a leakage signal coupled from a transmitter to a receive signal path associated with a receiver, the transmitter and the receiver contained in a single wireless device operating using at least two frequency channels, the receiver operating on a first one of the at least two frequency channels and the transmitter operating on a second one of the at least two frequency channels, the canceller comprising:

a first coupler coupled to the transmit signal path, the first coupler configured to generate a reference signal;

a second coupler coupled to the receive signal path, the second coupler configured to couple an adjusted signal to the receive signal path;

a third coupler coupled to the receive signal path, the third coupler configured to generate a sampled signal;

a parameter adjuster configured to adjust at least a first and a second parameter associated with the adjusted signal; and

a detector configured to detect a level associated with the leakage signal.

33. The canceller according to claim 32, wherein the single wireless device includes a frequency translating repeater.

34. The canceller according to claim 33, wherein the frequency translating repeater is configured to operate in one of a wireless area network (WLAN) and a wireless metropolitan area network (WMAN).

35. The canceller according to claim 32, wherein the single wireless device includes a wireless terminal for use in one or more of voice and data communications.

36. The canceller according to claim 35, wherein the wireless terminal is configured according to one or more of an IS-95 protocol, a IS-2000 protocol, a W-CDMA, and a derivative protocol.

37. The canceller according to claim 36, further comprising a controller configured to minimize the detected level by controlling the parameter adjuster so as to adjust the first and second parameters according to an adjustment procedure.

38. The canceller according to claim 37, wherein the first parameter includes an amplitude parameter and the second parameter includes a phase shift parameter.

39. The canceller according to claim 37, wherein the controller is further configured to minimize the detected level only during a calibration procedure.

40. The canceller according to claim 37, wherein the controller is further configured to continuously minimize the detected level.

41. The canceller according to claim 37, wherein the controller is further configured to continuously minimize the detected level only when the transmitter is actively transmitting signal.